

EXAMPLE 2. HYPOTHETICAL – EXISTING PC-BOILER (1304 MMBTU/HR), AND FACILITY WANTS TO ADD WOOD-FIRED BOILER (90 MMBTU/HR)

TOOLS:

Emissions Factors (EF) based on AP-42:

Pollutant	Emissions Factor (lb/MMBtu)
PM	0.4
SO ₂	0.025
NO _x	0.22
VOC	0.017
CO	0.6
Greenhouse Gases	
CO ₂	195 lb/MMBtu
CH ₄	0.021 lb/MMBtu
N ₂ O	0.013 lb/MMBtu

PROBLEM SOLVING:

Question 1: What would the emissions be for the proposed project?

Example Calculation:

PM Emissions [tons/yr] =

(90 MMBtu/hr) * (0.40 lb/MMBtu) * (8760 hr/yr) * 1 ton/2000 lb = **157.68 tons/yr**

CO₂ Emissions [tons/yr] =

(90 MMBtu/hr) * (195 lb/MMBtu) * (8760 hrs/yr) * (0.0005 ton/lb) = 76869 tons/yr

Calculations

Calculated Total Emissions from the PC-Boiler (Tons/Year):								
PM	SO ₂	NO _x	VOC	CO		CO ₂	CH ₄	N ₂ O
157.68	9.86	86.72	6.70	236.52		76869	8.278	5.12

Note: This example did not consider PM_{2.5} or PM₁₀ to try and keep it simple

Question 2: On a mass basis, what are the total emissions of GHGs?

CO₂+CH₄+N₂O = Total Emissions of GHG's (on a mass basis, tpy)

= **tons/year**

Question 3: What are the total emissions of CO_{2e}?

Step 1: Refer to Global Warming Potential (GWP) Table (Title 40, Part 98, Subpart A, Table A-1)

Step 2: Identify pollutants and their respective GWPs.

Pollutant	Global Warming Potential
CO ₂	1
CH ₄	21
N ₂ O	310

$$CO_{2e}(tpy) = \sum (GWP_i \times MassEmissionRate_i(tpy))$$

$$CO_{2e}(tpy) \text{ Example} = (\text{mass } CO_2 * 1) + (\text{mass } CH_4 * 21) + (\text{mass } N_2O * 310) =$$

$$= \underline{\hspace{2cm}} \text{ tons/yr}$$

Calculations [tons/yr] =

Question 4: So, we have

Source	GHGs(mass)	CO _{2e}
Existing facility	1218878	1227255
Modification		

APPLICABILITY ANALYSIS:

Question 1: Does this facility modification require a Title V permit “anyway” (e.g. significant modification, major source, regulated pollutants ≥ 100 tpy)?

Question 2: Does the permit action have GHG emissions in excess of thresholds?

- ☐ Facility emissions ≥ 0 TPY GHG mass
- ☐ Facility emissions ≥ 100/250 TPY GHG mass
- ☐ Facility emissions ≥ 75,000 TPY CO_{2e}
- ☐ Facility existing emissions ≥ 100,000 TPY CO_{2e}

What are the facility's permit requirements?

If the Permit Decision occurs before 1/2/2011: GHG's do not need to be considered

Step 1: If the permit decision occurs between 1/2/2011 and 7/1/2011:

PSD

Because the modification's net emissions are greater than the significant emission rates pursuant to ARM 17.8.801(27), the facility would be subject to PSD for NO_x (SER > 40 tpy) and CO (SER > 100 tpy). Because the facility is already subject to PSD, further analysis would be required to determine if GHGs are also subject to PSD:

Does the modification result in net CO₂e emissions \geq 75,000 TPY? _____ Yes/No
Does the modification result in net mass GHG emissions \geq 0 TPY? _____ Yes/No

Yes to both - then the GHGs must undergo PSD review.
NO to either - then the GHGs do not undergo PSD review.

Title V

Is the change to the facility considered significant and requires a modification of the Title V Operating Permit - "Anyway"?

No - GHG's do not need to be addressed.

Yes - GHG's must be addressed in the Title V Operating permit.

Step 2: If the permit decision occurs after 7/1/2011:

PSD

Because the modification's net emissions are greater than the significant emission rates pursuant to ARM 17.8.801(27), the facility would be subject to PSD for NO_x (SER > 40 tpy) and CO (SER > 100 tpy). Because the facility is a major source already subject to PSD, further analysis would be required to determine if GHGs are subject to PSD:

1. Are the existing source's net CO₂e emissions \geq 100,000 TPY? _____ Yes/No
2. Are the modification's net GHG mass emissions \geq 100 tpy? _____ Yes/No
3. Does the modification result in net CO₂e emissions \geq 75,000 TPY? _____ Yes/No

Yes to (1) - (3) - then the GHGs must undergo PSD review.
NO to (1), (2) or (3) - then the GHGs do not undergo PSD review.

Title V

Is the change to the facility considered significant and requires a modification of the Title V Operating Permit?

No - applicable requirement for GHG's do not need to be addressed.

Yes - applicable requirements for GHG's must be addressed in the Title V Operating permit.